CLAIMS

What is claimed is:

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38. A system for collision avoidance in formation flight, the system on a first aircraft, the system comprising:

   a. data link transponder means for receiving broadcast data from a second aircraft, the
broadcast data comprising indicia of position of the second aircraft;

   b. navigation means for providing indicia of current position of the first aircraft;

   c. means for determining relative aircraft position of the first and second aircraft in
accordance with the indicia of position of the second aircraft and the indicia of the current
position of the first aircraft;

   d. means for generating a steering command to maintain separation between the first
aircraft and the second aircraft in accordance with relative aircraft position of the first and
second aircraft; and

   e. means for transmitting the steering command to the second aircraft.

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39. The system of claim 38 wherein the transponder means receives the broadcast data via a
Mode-S data link.

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40. The system of claim 38 wherein the transponder means receives automatic dependent
surveillance broadcast data comprising the broadcast data.

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41. The system of claim 38 wherein the transponder means receives extended squitter comprising
the broadcast data.

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42. The system of claim 38 wherein:

   a. the navigation means comprises a global positioning system; and

   b. the navigation means provides the indicia of current position in accordance with an
output of the global positioning system.

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43. The system of claim 38 wherein the means for determining relative aircraft position
comprises a computer of a traffic alert and collision avoidance system.

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44. The system of claim 43 wherein the traffic alert and collision avoidance system determines
relative aircraft position without transmitting traffic interrogations.

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45. The system of claim 44 wherein the traffic interrogations comprise air traffic control radar
beacon systems messages.

1   46. The system of claim 43 wherein the traffic alert and collision avoidance system determines

2   relative aircraft position while operating in a passive surveillance TCAS mode.

1   47. The system of claim 38 wherein:

2   a. the means for determining relative aircraft position comprises a computer of a traffic

3   alert and collision avoidance system; and

4   b. the means for generating steering commands comprises a mission computer coupled

5   to the computer of the traffic alert and collision avoidance system.

1   48. The system of claim 38 wherein the steering command is transmitted in a message

2   comprising an address of a formation cell leader.

1   49. The system of claim 38 wherein the steering command is transmitted on a first link to the cell

2   leader for dissemination by the cell leader via a second link that is independent of the first link.

1   50. The system of claim 49 wherein the second link comprises a station keeping system digital

2   datalink.

1   51. The system of claim 38 wherein:

2   a. the system further comprises tracking means for maintaining the relative positions of

3   a plurality of cells;

4   b. the means for generating, in response to the tracking means, generates a plurality of

5   steering commands to accomplish maintaining the relative positions of the plurality of cells; and

6   c. the means for transmitting transmits the plurality of steering commands by addressing

7   selected steering commands of the plurality of steering commands to a respective cell leader of

8   each cell of the plurality of cells.

1   52. The system of claim 51 wherein addressing to a respective cell leader is in accordance with at

2   least one of a Mode-S address and a flight identifier.